Contribution ID: **170** Type: **not specified**

Modal and response spectrum analyses of ITER divertor module

Monday, 17 September 2018 11:00 (2 hours)

While most of previous numerical analyses have been carried out under thermal and electromagnetic loads due to their significance, severe dynamic loads may also threat its structural integrity. The present study is to investigate resistance of complex ITER divertor module against typical seismic loads. Two kinds of huge finite element models, which consists of cassette body, inner and outer vertical targets, dome and stabilizers, were developed; one is simplified model without coolant tubes and the other is detailed model with three layered coolant tubes. At first, modal analyses to predict dynamic characteristics such as frequencies and mode shapes were conducted by employing either block-Lanczos algorithm or symmetric coupling algorithm considering water in coolant tubes. Subsequently, response spectrum analyses were performed with complete quadratic combination technique by taking into account different seismic magnitudes based on ASME (American Society of Mechanical Engineers) B&PV Sec. III Appendix N. As results, calculated stress intensities at critical locations were compared with corresponding design stress intensities, according to ASME code rule, of which details dependent on sensitivity parameters were discussed.

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Session Classification: P1

Track Classification: Plasma Facing Components